

- 1. (Twice Amended) Apparatus for tightly-coupling hardware data encryption functions
- with software-based protocol decode processing within a pipelined processor of a program-
- mable processing engine in a network switch, the apparatus comprising:
- an encryption execution unit contained within the pipelined processor;
- an ALU, in response to reading an op-code, enables the encryption execution unit to
- read data from a memory shared by the ALU and the pipelined processor, and for the en-
- 7 cryption execution unit to process the data read from the shared memory; and
- a multiplexer to select as an output the result of processing by the encryption execu-
- tion unit rather than a result of ALU processing.



- 10. (Twice Amended) A method for tightly-coupling hardware data encryption functions
- with software-based protocol decode processing within a pipelined processor of a program-
- mable processing engine in a network switch, the method comprising the steps of:
- 4 providing an encryption execution unit within the pipelined processor;
- enabling, by an ALU in response to reading an op-code, the encryption execution unit
- to read data from a memory shared by the ALU and the pipelined processor, and for the en-
- 7 cryption execution unit to process the data read from the memory; and
- selecting as output the result of processing by the encryption execution unit rather
- 9 than selecting results from the ALU.



20. (Amended) A programmable processing engine of a network switch comprising:

an input header buffer;

an output header buffer; and

a plurality of processing complex elements symmetrically arrayed into rows and columns that are embedded between the input header buffer and an output header buffer, each processing complex element comprising a microcontroller core having an encryption tightly coupled state machine (TCSM) unit that is selectively invoked in response to the microcontroller reading an op-code; and

a selector to select an output from either the microcontroller OR the TCSM.

- 21. (Amended) A pipelined processor in a network switch, the processor comprising:
- an ALU internal to the processor responsive to a first set of opcodes;
- an encryption execution unit internal to the processor having an encryption tightly
- 4 coupled state machine (TCSM) responsive a second set of opcodes, the ALU, in response to
- an op-code, transferring processing to the encryption execution unit to process
- 6 in response to said second set of opcodes;
- a multiplexer to select output from the ALU OR from the encryption execution unit.



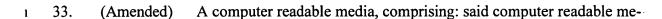
- 27. (Amended) A method for providing encryption functions within a pipelined processor in
- 2 a network switch, the method comprising the steps of:

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associating a first set of opcodes with an ALU internal to the processor;

associating a second set of opcodes with an encryption execution unit internal to the

- 5 process or having an encryption tightly coupled state machine (TCSM), wherein protocol
- 6 processing operations are performed by the ALU and encryption operations are performed by
- the encryption execution unit in response to said second set of opcodes; and
- transferring by the ALU, in response to an op-code, processing to the encryption exe-
- 9 cution unit to process encryption operations in response to said second set of opcodes;
- selecting output from the ALU OR from the encryption execution unit.



- dia containing instructions for execution in a processor for the practice of the method of
- 3 claim 10 or claim 27 or claim 40.



- 1 34. (Amended) Electromagnetic signals propagating on a computer network, com-
- 2 prising: said electromagnetic signals carrying instructions for execution on a processor for
- the practice of the method of claim 10 or claim 27 or claim 40.

Please Add New Claims 35, et al. as follows

1 35. (New) A router, comprising:

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- a processor having an ALU for processing op-codes and a tightly coupled state ma-
- 3 chine (TCSM) for performing encryption processing;
- a shared memory for providing data to either the ALU or the TCSM;
- the ALU, in response to reading an op-code, transferring processing to the TCSM,
- and the TCSM performing encryption processing on data read from the shared memory;
- a selector to select as output results from the ALU OR results from the TCSM.
- 1 36. (New) The apparatus of Claim 35, further comprising:
- the selector is a multiplexer.
- 1 37. (New) The apparatus of Claim 35, further comprising;
- the ALU selects whether the ALU or the TCSM reads data from the memory.
- 1 38. (New) The apparatus of Claim 35, further comprising:
- the TCSM performs DES data encryption standard encryption processing.

- 1 39. (New) The apparatus of Claim 35, further comprising:
- a sub-key generation component to provide a key to the TCSM.
 - 40. (New) A method for operating a router, comprising:
 - providing a processor having an ALU for processing op-codes and a tightly coupled
- state machine (TCSM) for performing encryption processing;
- reading data from a shared memory by either the ALU or the TCSM;
- transferring processing by the ALU, in response to reading an op-code, to the TCSM,
- and the TCSM performing encryption processing on data read from the shared memory;
- selecting as output results from the ALU OR results from the TCSM.
- 1 41. (New) The method of Claim 40, further comprising:
- using a multiplexer for selecting as output results from the ALU OR results from the
- 3 TCSM.
- 42. (New) The method of Claim 40, further comprising;
- selecting by the ALU whether the ALU or the TCSM reads data from the memory.

- 1 43. (New) The method of Claim 40, further comprising:
- performing DES data encryption standard encryption processing by the TCSM.

1 44. (New) The method of Claim 40, further comprising:

providing key to the TCSM by a sub-key generation component.

- 1 45. (New) A router, comprising:
- means for providing a processor having an ALU for processing op-codes and a tightly
- 3 coupled state machine (TCSM) for performing encryption processing;
- means for reading data from a shared memory by either the ALU or the TCSM;
- means for transferring processing by the ALU, in response to reading an op-code, to
- the TCSM, and the TCSM performing encryption processing on data read from the shared
- 7 memory;
- means for selecting as output results from the ALU OR results from the TCSM.
- 46. (New) The apparatus of Claim 45, further comprising:

2	means for using a multiplexer for selecting as output results from the ALU OR results
3	from the TCSM.
1	47. (New) The apparatus of Claim 45, further comprising;
2	means for selecting by the ALU whether the ALU or the TCSM reads data from the
3	memory.
1	48. (New) The apparatus of Claim 45, further comprising:
2	means for performing DES data encryption standard encryption processing by the
3	TCSM.
1	49. (New) The apparatus of Claim 45, further comprising:

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means for providing key to the TCSM by a sub-key generation component.